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LDRAR
2.7.1-2
12/1/05

December 1, 2005

Ms. Allison Hiltner
US EPA Region X
1200 Sixth Avenue
Seattle, WA 98101

Re: Food Web Model Memorandum 2: Modeling Approach – November 10, 2005

Dear Allison:

NOAA appreciates the opportunity to provide comments on the Food Web Model Memorandum 2 (dated November 10, 2005) prepared by Windward Environmental, LLC. NOAA is a trustee for aquatic habitats, fish and other aquatic species in the coastal areas of the United States. The Lower Duwamish provides important habitat as well as migration access to and from the Duwamish/Green River watershed for juvenile salmonids, including ESA listed Chinook. Therefore, NOAA is very interested in participating in the remedial process on the Lower Duwamish Waterway to ensure that the remedy selected is protective of NOAA trust resources.

General Comments

NOAA's overarching concern is that this memo does not delve into the details of the modeling approach. It is more of an overview of a modeling approach. There are many details lacking, making it difficult to provide comments outside of questions. The treatment of spatial and time scales is an unknown and will have a significant impact on model inputs and subsequent outcomes.

Much more detailed information on the parameterization and the use of data should be provided in a memorandum that describes the "modeling approach." The initial parameterization, including the source of all data/information used and approach to deriving the initial values should be part of Tech Memo 2. At a minimum, this information, in sufficient detail to make the approaches to parameterization completely transparent, should be provided for review along with complete documentation before preliminary model runs are conducted. The current document schedule does not present the initial parameterization approach and documentation until Tech Memo 3, which includes preliminary model runs.

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NOAA suggests an interim memo prior to Tech Memo 3 providing the initial parameterization approach and documentation.

Information on the use of site-specific or modeled data (water, sediment, tissue) is mostly discussed only in generalities, without any specific discussion of how the data will be used in model development or testing. Without knowing how these data will be treated, it will be extremely difficult to evaluate the model and the impending preliminary model run results.

The decision not to validate the model needs to be reconsidered. This model will play a significant role in developing SQTs and evaluating residual risk. A great deal of uncertainty will already be introduced in model calibration because there is little data available for this step. What level of confidence will EPA have in using the model in a decision making framework if the model is not validated? Tissue data collected in 2005 could be used for this purpose or additional 2006 samples could be collected to assess model predictions.

What approach will be used to run the FWM in reverse to determine SQTs from tissue risk levels determined in the risk assessments? It may be much more complicated than back-calculating a sediment concentration using BSAFs and may require additional assumptions. Since this is one of the primary uses of the FWM, there should be a detailed discussion included in this tech memo.

Specific Comments

p.4: *"A similar correlation of PCBs as the sum of Aroclors and as TEQs was also found for surface sediment. Demonstration of this relationship is important because sediment is a key input parameter to the FWM."* Because of differential bioaccumulation of PCB congeners, this is only important for the FWM if the composition of coplanar PCBs in sediment and tissue are identical. To look at the risk, the relationship between Aroclors and TEQs in tissue needs to be evaluated for all species.

Fig. 3-1: What is the model that goes with the R^2 value? It appears that benthic invertebrates, clams, shiner surfperch have different PCB-TEQ relationships. Is one relationship appropriate for all species? All fish? Are these relationships consistent throughout the geographic extent? Are these relationships identical using fish and avian TEFs? If we're looking at risk to fish, you need to look at TEFs in fish; risk to avians, TEFs in avians. It's not sufficient to only evaluate based on mammalian TEFs.

Fig. 3-2: What is the model that goes with the R^2 value? The relationship should be tested to determine if the composition of coplanar PCB congeners is consistent throughout the study area.

p.7, P1: *"The consistency of these correlations indicates that modeling total PCBs (as Aroclors) should allow SQTs, RBGs, and residual risk estimates to be made that are health-protective of the overall risk attributable to PCBs."* While total PCBs may be

consistent, the PCB composition in sediment and tissue differ from each other. Please explain how consistency within media (tissue, sediment) supports this conclusion (assuming these media-specific relationships are consistent throughout the study area and across species).

p.7, P2: *"The spatial areas of the LDW to be modeled are based on both the scales over which risks will be estimated as well as the potential exposure areas (home ranges) of the fish and crab species being modeled."* The approach to determining "potential exposure areas" needs to be defined. Will all of these areas be given equal weight? Will foraging areas be treated as part of a larger "home range?" Will exposure areas be limited to the LDW study area (eg., adult English sole may migrate out of the study area in winter)?

p.7, P3: *"SQTs will generally be calculated on a site-wide basis."* What does this mean? Does this imply that SQTs will be applied as area-weighted averages across the entire study area? Will cohesive and non-cohesive sediment areas be considered equivalent for exposure? For example, for the FWM at another site, EPA assumed that fish spent 75% of their time in cohesive sediment areas (EPA 2000, HR Revised Baseline Modeling Report).

p.7, P5: *"English sole appear to be found less often in low salinity conditions (Toole et al. 1987). Therefore, in addition to LDW-wide modeling, English sole may also be modeled in two subsections of the LDW (a northern and a southern subsection) based on the location of the salt wedge and salinity information."* NOAA questions the determination of these subsections. Toole et al 1987, in their review of juvenile English sole (from areas not including Puget Sound), did not define "low salinity" conditions. Please provide salinity maps of the LDW (for both low flow and high flow periods) that can be used as a basis for creating reasonable subsections. Based on the fish sampling efforts from 2004, area 4 may be more appropriate as a subsection.

p.13, P1: *"Before any model runs can be conducted, the FWM must be fully parameterized (i.e., specific values must be provided for each model input parameter). Parameterization is an iterative process. Multiple lines of evidence will be explored to select the initial best approximation and the reasonable upper and lower bound estimates for each input parameter value. Sources of information for model parameterization will include site-specific data from Phase 1 and Phase 2 investigations, and either site-specific or other information available from the grey literature, agency reports, and peer-reviewed literature. The FWM will initially be parameterized with the best approximate average value for the LDW-wide exposure area."* The current document schedule has the initial parameterization approach and documentation provided in Tech Memo 3 along with preliminary model runs. The initial parameterization, including the source of all data/information used and approach to deriving the initial values, should be part of this document, Tech Memo 2, describing the model approach. At a minimum, this information should be provided for review along with complete documentation before preliminary model runs are conducted.

p.13, P2: *"Site-specific data are available for numerous input parameters to the FWM (e.g., organism weights and lipid fractions, water quality parameters, chemical concentrations in*

sediment, organic carbon content of sediment). Statistical distributions of these site-specific data are generally available on an LDW-wide spatial scale.” Statistical distributions of lipid fractions for individual fish (not composites) are not available from the 2004-5 sampling and would need to be estimated from the composite distribution. Will interannual variability be included in the parameter distributions?

p.13, P2: *“Available summary statistics for these types of parameters include the mean, geometric mean, maximum, and minimum.”* The mean and maximum lipid and contaminant concentrations in tissues are not available and will need to be estimated. Other summary statistics, such as the 95% UCL on the population mean, can also be derived.

Averaging exposure spatially across the entire study area and temporally over the entire year is not reasonable or appropriate for modeling PCB bioaccumulation. PCB exposure in areas of elevated concentrations, during periods of maximum growth (consumption), likely are most important to tissue residues. Because depuration of PCBs from fish (and other biota) is extremely limited, growth dilution is the primary mechanism that concentrations are reduced (except for adult female contaminant losses with release of eggs). How will these concepts be addressed in the model?

Model performance metrics should be based on the mean and variability of the population for each species. What level of difference can be determined based on the variability observed? Is a factor of 2 or 5 achievable? Composite samples can be used to provide an estimate of the mean, but the variability needs to be for individuals of the population and only can be estimated from the variability of the composites.

p. 14 *“Modeled Data-Total PCB concentrations in the water column will be determined based on the output of a hydrodynamic model calibrated with various LDW site data (e.g., current velocities, salinity, total suspended solids [TSS], metals, and PCBs).”* How will the model use total PCB concentrations in the water column: vertically integrated, time-averaged single parameter estimate for entire LDW? The existing EFDC model calibration, which was based on estimated water column concentrations from 2 SPMD non-representative locations collected in March-April, predicts that highest water column PCB concentrations will be during the high flow period of the year: this is inconsistent with measured water column concentrations from other PCB-contaminated rivers. This parameter estimate should be considered highly unreliable and treated accordingly.

p.15, P1: *“The statistic used to represent the “empirical data” for the SPAF will be the arithmetic mean of chemical concentrations for all composite samples of a given species at a given scale. Data from different datasets (Phase 1, 2004, and 2005) may be combined or evaluated separately, in consultation with EPA and Ecology.”* Will variability around the mean (of the population) be considered in the evaluation? Data from different years should be used to address interannual variability.

p.16, P1: *“For the initial calibration of the LDW-wide spatial scale, those parameters that the model has been proven highly or moderately sensitive to in the past (Arnot 2005) and*

those with high variability or uncertainty will have their values adjusted." What are these parameters and what will be the approach to determine how they should be adjusted.

p. 17, Table 5-1: *"Total concentration of a chemical in the water column."* What are the spatial and temporal scales? The uncertainty of these estimates should be considered extreme (i.e., varying by at least an order of magnitude should be considered in the sensitivity analysis).

"Weight of the organism": The weights of individual fish included in the composite samples range from 73-600 g for English sole, 13-180 g for sculpin, and 2-40 g for shiner surfperch-how will the parameter value for each species be determined? Is it assumed that fish over these ranges in size (and presumably age and life-history stage) will have the same lipid fraction?

Mean water column temperature: Over what scale (spatial, temporal) will this parameter be varied?

p.21: *"water parameters may also be varied, depending on the variability of the data."* Existing water column PCB concentration data are too limited to assess variability on any scale.

Will SWAC estimates for organic carbon-normalized sediment concentrations be used in the modeling? If so, how will those estimates be derived?

p.23: *"All model equations and their interdependencies in the computer program will be independently reviewed..."* What does this mean? How will these "interdependencies" be reviewed.

"All input parameters will be reviewed by a Windward staff person..." How will this review be conducted? What criteria will be used?

The following are decision points on a variety of issues, some with significant implications for the FWM. NOAA would like the opportunity to provide input on these issues. Will there be subsequent tech memos incorporating these topics for comment? When in the process will these issues be addressed?

Pg. 2 "Therefore, if RBGs are calculated for other chemicals that are either metabolized) or otherwise regulated by organisms, an approach for evaluating the linkage between concentrations of these chemicals in sediment and tissue other than the FWM would need to be determined in coordination with the EPA and Ecology."

Pg. 3 "A tech memo currently being prepared summarizes the risk estimation methods that may be used in the Phase 2 HHRA and ERA, and provides rough risk estimates for PCBs. This memorandum will be submitted to EPA and Ecology in December 2005."

Pg. 7 "This relationship, and its relevance to remedial decision making, will be further explored with EPA and Ecology following their review of the preliminary PCB calculations memorandum as well as a review of approaches used at other Superfund sites."

Pg. 11 "If the FWM cannot be calibrated to meet the model performance criterion, further actions will be determined in consultation with EPA and Ecology."

Pg. 13 "The method used to calculate the SWACs will be determined in consultation with EPA and Ecology."

Pg. 15 "Data from different datasets (Phase 1, 2004 and 2005) may be combined or evaluated separately, in consultation with EPA and Ecology."

Pg. 15 "If the model cannot be calibrated to meet this standard, LDWG will discuss various options with EPA and Ecology."

Pg. 16 "If the FWM cannot be calibrated within a factor of 5 at any spatial scale, further actions will be determined in consultation with EPA and Ecology."

Pg. 22 "If the calibration process does not approach the model performance goal, then other options, including the potential modeling of a subset of individual PCB congeners, will be discussed with EPA and Ecology."

References: please provide a copy of Arnot 2005, cited on Pg. 16.

Thank you for the opportunity to submit these comments. Based on the 2 tech memos NOAA has reviewed, there will be little basis for evaluating preliminary model runs in the next memo. NOAA recommends an interim document that provides the details of the modeling approach and an opportunity for evaluation prior to review of the model runs. At the time EPA receives the memorandum describing initial model runs, an electronic copy of the working model, including tables of input parameters, should be provided. Please contact Jay Field (526-6404) or me if you have any questions.

Sincerely,

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